This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

(Original) 1. A method of immobilizing membrane-associated molecules in silica matrixes comprising combining a liposome-assembly comprising the membrane-associated molecule with a protein- and membrane-compatible sol-gel precursor under conditions which allow a gel to form.

(Original) 2. The method according to claim 1, wherein the protein- and membrane-compatible sol-gel precursor is selected from an organic polyol silane and sodium silicate.

(Original) 3. The method according to claim 2, wherein the organic-polyol silane precursor is derived from sugar alcohols, sugar acids, saccharides, oligosaccharides or polysaccharides.

(Original) 4. The method according to claim 3, wherein the organic-polyol silane precursor is derived from glycerol, sorbitol, maltose or dextran.

(Original) 5. The method according to claim 4, wherein the organic-polyol silane precursor is selected from diglycerylsilane (DGS), monosorbitylsilane (MSS), monomaltosylsilane (MMS), dimaltosylsilane (DMS) and a dextran-based silane (DS).

(Original) 6. The method according to claim 5, wherein the organic-polyol silane precursor is diglycerylsilane (DGS).

(Original) 7. The method according to claim 1, wherein the membrane-associated molecule is selected from non-natural ionophores, ion channel proteins, ion-channel receptors, G-protein coupled receptors, membrane transport proteins or membrane associated enzymes.

(Original) 8. The method according to claim 6, wherein the membrane-associated molecule is selected from gramicidin, bacteriorhodopsin, the acetylcholine receptor and ionomycin.

(Original) 9. The method according to claim 1, wherein the liposome comprises phospholipids.

(Original) 10. The method according to claim 9, wherein the lipid comprises 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC).

(Original) 11. The method according to claim 1, comprising the steps of :

(i) combining an aqueous solution of the protein and membrane-compatible, sol gel precursor with an aqueous solution of a liposome assembly comprising the membrane-associated molecule;

(ii) adjusting the pH of the combination of (i) so that it is in the range of about 4-11.5;

(iii) shaping the combination into a desired shape;

(iv) allowing the combination to gel; and

(v) aging and partially drying the gel.

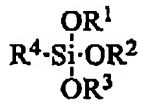
(Original) 12. The method according to claim 11, wherein the gel is dried in an aqueous buffer, optionally comprising an effective amount of a humectant.

(Original) 13. The method according to claim 11, wherein the aqueous buffer comprises about 5% to about 50%% (v/v) of glycerol.

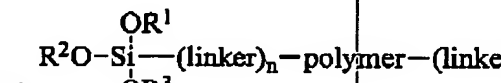
(Original) 14. The method according to claim 1, wherein the liposome- assembly comprising the membrane-associated molecule and the protein and membrane-compatible, sol-gel precursor are combined in the presence of an indicator molecule and/or in the presence of one or more ligands for the membrane-associated molecule.

(Original) 15. The method according to claim 1, further comprising combining the liposome assembly and sol-gel precursor in the presence one or more additives which causes spinodal decomposition (phase transition) before gelation.

(Original) 16. The method according to claim 15, wherein the one or more additives is selected from one or more of water-soluble polymers and one or more compounds of Formula I:



I

wherein wherein R^1, R^2 and R^3 are the same or different and represent a group that may be hydrolyzed under normal sol-gel conditions to provide Si-OH groups; and R^4 is group selected from polymer-(linker)$_n$- and  , where n is 0 or 1 ,

(Original) 17. The method according to claim 16, wherein the one or more additives are selected from one of more water soluble polymers.

(Original) 18. The method according to claim 17, wherein, the one or more water soluble polymers are selected from one or more of polyethylene oxide (PEO); polyethylene glycol (PEG); amino-terminated polyethylene glycol (PEG-NH_2); amino-terminated

polyethylene oxide (PEO-NH_2); polypropylene glycol (PPG); polypropylene oxide (PPO); polyalcohols; polysaccharides; poly(vinyl pyridine); polyacids; polyacrylamides; and polyallylamine (PAM).

(Original) 19. The method according to claim 18, wherein the one or more water soluble polymers are selected from one or more of PEO, PEO-NH_2, PEG, PPG-NH_2, polyNIPAM and PAM.

(Original) 20. The method according to claim 19, wherein the one or more water soluble polymers are selected from one or more of PEO, PEO-NH_2 and polyNIPAM.

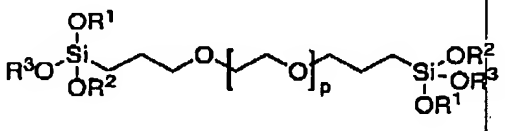
(Original) 21. The method according to claim 20, wherein the water soluble polymer is PEO.

(Original) 22. The method according to claim 21, wherein the PEO has a molecular weight between about 2000-100000 Da.

(Original) 23. The method according to claim 22, wherein the PEO has a molecular weight of about 10000 Da.

(Original) 24. The method according to claim 16, wherein the one or more additives are one or more compounds of Formula I.

(Original) 25. The method according to claim 24, wherein the compounds of Formula I are selected from one or more of compounds of Formula 5:



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wherein p is an integer between about 4 and 227 and R^1-R^3 are the same or different and are selected from C_{1-4}alkyl.

26.-49. (Cancelled).